THE DAON THEORY
The Electron

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Abstract

The **Daon theory** is a new general theory of physics, it is a completely new way to approach physics and includes, in principle, all phenomena of nature.

The theory is presented in a series of closely related papers treating Electromagnetism, Atomic physics, Particle physics, Gravitation and Cosmology. They should be red in this order for a complete understanding.

The numerical value of the main natural constants and parameters are calculated, while the explanation for the various natural phenomena are simple and logical. All the results from this theory agree, as far as we know, with experimental data.

The Daon theory makes it possible to give simple explanations to all electromagnetic phenomena. We analyse the electric field, magnetism and explains the electron's associated wave. We find at the same time the dielectric constant, the permeability constant, the Planck's constant and the fine structure constant.

It follows an analysis of an electron under acceleration giving the explanations to the phenomena of the Electro-Magnetic wave.

We there after examine the modification an electron's characteristics at high velocity.

General introduction

Our knowledge of physical phenomena is split into four different areas, each of which are associated with a specific force, they are usually called Electro-Magnetic, weak (QED), strong (QCD) and Gravitational forces. Each one of these areas has a corresponding theoretical model which has been fitted to experimental data. These theories give a precise description of the force symmetries, acting within each specific area, but *do not* give any precise idea of the underlying fundamental forces.

The particles are described with the help of their associated wave, which leads to a precise knowledge of the wave phenomenon, but unfortunately, also leads to total ignorance concerning the source of the wave. This is the reason for the need of a new and different approach, able to explain the forces acting at an even smaller distance than the wave-length of the associated wave.

Our knowledge, of the world around us, is in fact very shallow. We are still not able to answer questions like: What is potential-charge? What is mass-energy? What is force-field?

The main reason for the difficulties connected with the type of questions above, is that the field concept is very obscure. The force, connected with a field, has to have some *means of action.* The field must therefore, have some substance. The action of a field indicates that the space should contain something, as also suggested by phenomena like the electro-magnetic wave, the associated wave,...

The relativity as well as the quantum mechanics have lead to dead ends, not reaching the fundamental phenomena of physics. It is therefore necessary to make the development of a new theory as simple and fundamental as possible.

Chapter 1

Introduction to the Daon theory

It is evident that a better understanding of space is needed! A starting point, to approach this goal, can be obtained by taking a closer look into some weak points in modern physics, which all have a direct connection with what we want to develop.

- Let us suppose that an electron is surrounded by virtual particles. The space neutrality must always be maintained, so the creation and destruction of virtual particles must happen in pairs. The virtual particles can not move very far since their lifetime is very short, while the real electron should feel the mean influence from all the virtual charges, distributed symmetrically around it. The charged virtual particles are influenced by the real electron so that the positive charges are attracted towards the electron while the negative charges are repulsed.

  Let us now examine the interaction between two electrons in collision: The sum of the virtual particles charge must be zero, since, at some distance away, the electron charge is constant. But, when the distance between the two electrons is shortening, the negatively charged virtual particles must be repulsed between the two real electrons, so that they will move away from a line passing through the centres of the two electrons. The positively charged virtual particles will be attracted towards the same line, as schematically demonstrated in figure 1.1. It follows that the force acting between the two real electrons (compared with the coulomb's law) must be *reduced* at shorter distances. But experiments show an *increase* of the force!?

- Several types of virtual particles such as $\gamma, e, \mu, \pi, \ldots$ would mean a radial variation of the effective force between the two electrons. That is a variation of the force, due to the difference in energy needed for the creation of each specific virtual particle. However experiments show a monotone

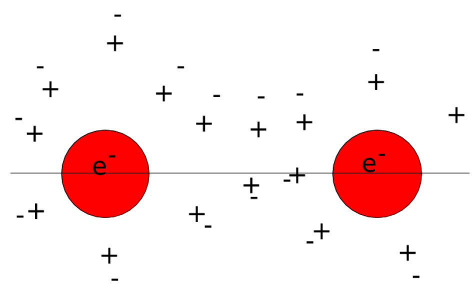

Figure 1.1: The virtual charged particles distribution, around two electrons

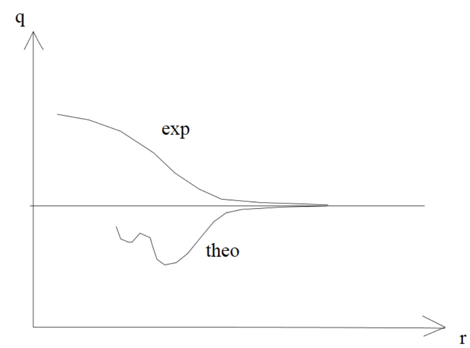

Figure 1.2: Schematic description of the behaviour of the force, acting between two electrons, relative to the distance between them.

curve of the force, as presented schematically in figure 1.2, i.e. there is no structure in the graph. The conclusion must be that *virtual particles do not exist around the electron* or, if you prefer, that some other much stronger phenomenon exists, so that the effect of the virtual particles is invisible!

- If we examine the interaction between two charge particles, having high but different velocity vectors. How can such particles have an interaction? They do not know where their partner is, so how can they interact in the correct direction? This can be done only through a massive creation of virtual photons in all directions, where the virtual photons must "live" long enough to transmit a signal (how?), between the two particles!!?

- It has been shown[2] that the electric field around an electron is associated directly with the electron, i.e. any real or eventual virtual photons around the electron has noting to do with the Coulomb's field.

- We examine the photons supposed to be emitted from an antenna (the antenna is considered to be spherical for reasons of simplicity). Consider the photon as an object having an EM-oscillation, moving with the velocity of light along a straight line.

The EM-amplitude of the radiation must be proportional to the local density of photons, if the field from such an antenna is constituted by photons. The EM-amplitude must then be reduce with the inverse of the emitted photons density (i.e. $\frac{1}{r^2}$). But, from measurements, it is know that the amplitude of the radiated EM-field is reduced inverse proportional to the distance ($\frac{1}{r}$). *The EM-field can therefore not be constituted by photons!*

Imagine an EM-field, emitted from such an antenna, having a very slow oscillation; we have then a quasi stationary electric-magnetic field, without any photons! This means that also *the electrostatic field is not constituted by photons!*

- How is the EM-field propagating in space and why is the speed of light limited to a precise value?
- It's demonstrated by experiment that an electron is a single spherical particle, the electron's associated wave must therefore originate from some oscillatory motion of the electron! This oscillation is modified by the velocity of the electron, as described by the law of Louis De Broglie ($mv\lambda = h$), but, if the space is empty, how can the speed (relative to what) of an electron modify its frequency of oscillation? A force must act on the electron, but from where is such a force coming?

What is constituting the electric field around an electron? Virtual particles do *not* exist, around an electron, as demonstrated above. Also theories using fields, constituted by some sort of "liquid", must be excluded since, such models do not explain how, the then necessary "flux" can be maintained between different charges. The photon exchange used as an explanation of the field, was already examined and discarded above.

Let us end by one of the greatest "misunderstandings" in today's physics, *the mass*. According to experimental evidence, the mass grows with velocity according to Einstein's famous law $m = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}$. But, according to the same Einstein's special theory of relativity [5], this mass can not be accepted as a "true" mass, even if all experimental evidence show that this supplementary mass is an absolutely normal one.

The only possible answer to all these problems must be that the space is filled with something, i.e., **there must exist a media**.

At this point a discussion of the Michelson-Morley [4] experiment becomes indispensable, since this is the only experiment believed to show the emptiness of space. But, to be able to discuss this experiment, it's necessary to know more about the electric field around a charge, since this must be deformed by the relative velocity between the charge and an eventual media. Such a deformation must lead to a corresponding deformation of the electron trajectories within the atoms and molecules, deforming all material including the experimental equipment.

It is now necessary to introduce a reference system, to be able to perform some calculations. There is only one possible general reference system; that is the system in which the Cosmic Microwave Background Radiation is constant in all directions! We use this system in the following calculations although the expansion of the Universe is neglected, if not other ways stated.

Chapter 2

The electron

The consequences of the equations of Maxwell indicate that the source of the Electro-Magnetic field is the charge. It is therefore necessary to focus our effort on a charged particle, to obtain some basic knowledge of the corresponding physical phenomena. The electron seems to be the most simple construction of nature but contains at the same time most of the basic unknowns in today's physics, such as charge, mass, field, associated wave, ...

The experimental data show that the electron is surrounded by an electric field extending towards infinity. There is no evidence that this field is modified by other fields or forces at smaller radius.

This leads us to believe that the electric field, as well as the electron, is constituted by identical real (always existing) objects. We here suggest the existence of a specific object proposed as the basic constituent of all fields, the name **DAON** [1] is therefore suggested for this specific object.

Supposing that daons are the constituents of the electron makes it necessary to believe that the positron, its anti-particle, is constituted by objects in all identical to the daons of the electron but having some characteristic giving it the opposite effect in the radial sense. An anti-daon could here be suggested but the interaction between daons must be such that an anti-daon must be the daon turned around into the opposite direction, the daon must therefore be identical with its anti-daon. The necessary action between daons must then come from a rotation i.e. *the substance of a daon must rotate around an axis, giving a direction to the daon.*

The only possible difference between an electron and a positron must then be that if the positron daons points inwards, the daons of an electron must point outwards from the center; this definition of direction has been defined to give the "correct" behaviour of the magnetic field around the electron (see below).

Now try to imagine the daons constituting a shell around an electron, all pointing in the radial direction, relative to the center of the electron. Around

[1] Dao (Tao) is a fundamental concept in the old chines culture, it is the road through the universal harmony. It's constituted by Yin (darkness, cold, contraction, rest) and its opposite, Yang (light, warmth, expansion, activity)

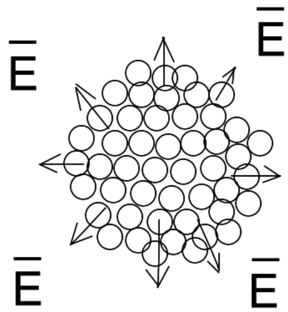

Figure 2.1: Schematic picture of a cut through the center of an electron

this daon shell is another one, constituted by daons all again pointing in the same radial direction as the daons in the previous shell etc. The result will be something looking similar to the schematic cut of an electron in figure 2.1. The same should then be true for a positron besides the direction of its daons being inverse relative to the electron.

This gives a model of an electron where the constituents of the electric field are also the constituents of the electron itself. All physical characteristics of an electron must then be due to the collective action of the daons constituting it.

2.1 The Daon

Let us imagine a charged sphere of matter, where the daons, constituting the electric field, extend versus infinity. The daons constituting the field can not disappear (as by magic) when the sphere is discharged i.e. the daons must always be there also when the sphere is neutral.

The earth is constituted by an enormous amount of charges, with an identical number of positive and negative ones, this means that there must be a huge amount of daons around the earth, extending versus infinity, according to the suggestion above. There is no privileged direction in space, it's therefore necessary that all possible directions of the daons rotational axis are equally represented. These *disordered* daons will have a growing importance, they therefore deserves a specific name, they will henceforth be called *free daons*. They fill up all space besides the space occupied by *ordered* daons. The space is neutral and isotropic so the free daons must be in equilibrium having equally strong *medium* value of contraction/expansion as well as attraction/repulsion.

A charge must be a stable and well ordered set of daons, therefore, if a charge is placed within a media of free daons, the daons have to become more and more "ordered", closing in on the charge, until the increased order is matched and a radial equilibrium is established. It follows that an electron, having "perfect" order, doesn't exist. There is always a gradual passage, from disorder to order, going from "far away" versus the center of the electron.

The attraction/repulsion between two daons must depend on the relative direction of motion, of their respective substances, in the zone of interaction. Four specific situations of interaction, between identical daons, is proposed, in figure 2.2:

(a) The substances of the respective daon are, in the zone of interaction, rotating in the same direction at the same speed. The daon substances relative velocity in the zone of interaction is zero. The daons feel a *repulsion*, leading to an increase of the daon sizes, without transverse action.

(b) The substance of the respective daon are, in the zone of interaction, rotating in opposite direction at the same speed. The daons feel an *attraction*, coming from the surface of interaction, leading to a reduction of the daon sizes. The daon substances relative velocity is maximal in the zone of interaction, there is also here no transverse action!

(c) The substance of the respective daon are, in the zone of interaction, rotating in the same direction. In this situation the daons *angular* velocity vectors have an angle between them, but the respective daon substances have still parallel velocities, in the zone of contact! The attraction between the daons, along a line passing their centres, is identical to the situation in *b)*. There is no transverse action, since the substances velocities are parallel in the zone of interaction.

(d) The substance of the respective daon are, in the zone of interaction, rotating with an angle relative to each other. In this situation the daons angular velocity vectors have an angle ψ between them, as also the substances velocity vectors. The attraction between the daons, along a line passing their centres, is then proportional to $\cos\psi$, while the transverse repulsion is proportional to $\sin\psi$, in the zone of contact.

The daon change size under interaction but the medium change of size must be zero in a situation of equilibrium, i.e. *the effective attraction, contracting a daon, must then be equal to the effective repulsion expanding it.*

An interesting thought is the following: If two isolated daons have an interaction, the size of the two daons would drastically change until the end of interaction. The sizes of such daons would then vary dramatically so that a smooth behaviour of any interaction, like electromagnetic fields and waves, would be difficult to understand, it follows that, *a daon without interaction must expand until inhibited to do so by its neighbours i.e., a daon must always be in contact with other daons.*

Let us examine a daon in equilibrium within an electron shell; imagine a daon, as a sphere of some substance wanting to expand but stopped, by the surrounding neighbours, to do so. A daons surface can then be separated into zones of interaction and zones of non-interaction. Some zones are alternating between compression and expansion, since the daon is rotating, but there are also zones

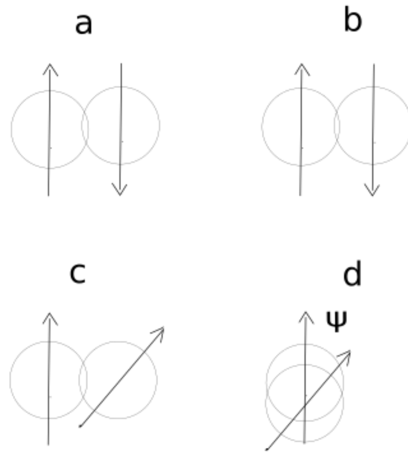

Figure 2.2: Four representative positions of interaction between two daons.

having no interaction besides a "will" to expand. This means that a daon is kept together by some sort of elasticity; otherwise the continued expansion of zones of non-interaction would make the daon "explode". The attraction-repulsion between identical daons, in a situation of equilibrium and in the direction of a line connecting the two daon centres, can therefore be written,

$$a_{d_{\parallel}} = -C\omega_d^2 \; r_d \cos\psi \tag{2.1}$$

ψ is the angle between the directions of the two daon-substances velocities in the zone of contact. ω_d is the angular velocity of the daon substance and r_d is the daon radius. C is an arbitrary constant.

The daons will also obtain a transverse repulsion, perpendicular to the one indicated above, which in the same way, can be written

$$a_{d_{\perp}} = C\omega_d^2 \; r_d \sin\psi \tag{2.2}$$

The Daon substance velocity of rotation, is then

$$v_d = \omega_d \; r_d \tag{2.3}$$

The action-reaction between daons must be independent from the position of the zone of interaction. If the attraction was stronger, for example on the daons equator, the size of the daons would be locally reduced i.e., the form of the daons would become elliptical. This would mean a dependence on the order which, would lead to completely different characteristics of the electron and would disagree with Maxwell's equations. It is therefore necessary that a daon's action-reaction depend only from the relative directions of the daon substances velocities and not on the position of the zones of interaction! It follows that *a daon must in medium be spherical*

The daon can not have any mass, since a mass would make it impossible for any particle to move within the media of free daons, the reaction between two daons must therefore be immediate, i.e., without acceleration. This is the reason why we do not call the daon a particle but an *object* and why we us the formulation *action* instead of *force*.

The action becomes a force when several daons are attracted towards each other and interact with an external field, since then the total action must be divided between the participants, leading to a resistance i.e., a mass (as defined by Newton). The daon's mass can be considered to be a system constant.

The interaction between daons is such as to maintain the daon's velocity of rotation at a constant value. This is necessary since otherwise the interaction would reduce the medium velocity of rotation of the daons to zero!

It should be noted that a daon's velocity of rotation must be faster then the effective velocity, since the interaction between two daons must modify their size. It is therefore necessary to include a radial velocity of the daons substance, leading to a reduction of the azimuthal velocity of rotation. It is therefore the effective velocity of rotation which we use in our calculations.

2.2 An electron takes form

Let us now imagine a concentric shell, filled with daons kept together by an attraction between daons having quasi-parallel rotational axis, all pointing, in medium, in the radial direction. The daons within such a shell must be kept together because of the daons attraction towards each other. The daons must also be attracted to the daons of the upper and under laying shells, since also these must have the same, quasi parallel, direction of their rotational axis. The strongest attraction, between daons from different shells, is found in the middle of a triangle of daons in a shell. The daons belonging to the neighbouring shells therefore place themselves preferentially into these positions. The expansion/contraction and attraction/repulsion of each daon must in medium be zero, in any static situation. In case of the electron, each daon is necessarily in equilibrium within its own shell, since the daons are identical and placed symmetrically around it.

The number of daons in a shell is

$$N = \frac{4\pi r^2}{\pi r_d^2}\frac{\pi}{2\sqrt{3}} \tag{2.4}$$

$\frac{\pi}{2\sqrt{3}}$ is the "filling factor" of circles on a plane surface. The number of daons in a shell is very high, besides in the last couple of shells at the electron's center, so the curvature has been neglected, if not other ways stated.

The daons can move around freely, in a region where the order is very low,

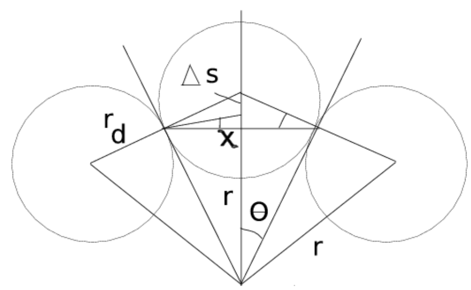

Figure 2.3: Geometry of a daon in equilibrium, interacting with daons within its own shell.

meaning that the shells have no "rigidity". The total attraction between neighbouring shells, far from the electron's center, is then almost constant. The radial component of interaction, between daons in the same shell, becomes important closing in on the electron's center, since the size of the daons is continuously decreasing, in neighbouring shells. A daon must adapt its radius so that its attraction is constant in all directions. This can be obtained only by a displacement of the daon's center in the direction of the electron's, i.e. a deformation of the daon. The equilibrium is obtained, when the attraction is equilibrated around each daon.

The radial component of attraction, on an individual daon, from the upper layer must be equal to the radial attraction from the lower layer plus, the radial component of attraction coming from the daons of its own shell. The total radial attraction between two shells can now, with the help of equations (2.1-2.4), be written

$$f_n = 3Na_d \cos^+ \phi + 6Na_d \sin \chi \tag{2.5}$$

ϕ is the angle between the electron radius and a line passing the center of two interacting daons, in different shells ($\cos \phi \simeq \sqrt{\frac{2}{3}}$). The second term is the radial component of interaction between each daon and its 6 neighbours within the same shell, giving the increase of the action (and the number of daons) from a shell to the next. χ is defined as.

$$\sin \chi \simeq \frac{r_d}{r} - \frac{\Delta s}{r_d} \tag{2.6}$$

Δs is the displacement of the daon's center relative to the daon's geometrical center (see figure 2.3).

The attraction between two shells, far from the electron, can now be expressed in the following way:

$$f_n = N3\ C\frac{v_d^2}{r_d} < \cos \psi > \cos \phi = C\sqrt{8}\pi \frac{r^2}{r_d^3} < \cos \psi > v_d^2 \tag{2.7}$$

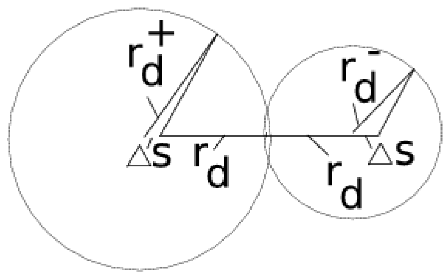

Figure 2.4: Geometry of the interaction between two daons having different size.

$< \cos\psi >$ is the order representing the medium coupling in the interaction between daons.

Each daon has 3 interaction zones with the daons of the next neighbouring shell. The examined daon and three daons in the next shell, have the geometry of a regular pyramid.

The equilibrium around an electron can be written as a number of perfectly ordered daons, placed on a sphere around the electron, subtracting the action from completely disordered free daons placed on the same sphere. We get:

$$NC\frac{v_d^2}{r_d} < \cos\psi >= NC\frac{v_d^2}{r_d} - N_{fd}C\frac{v_d^2}{r_{d_{fd}}} \rightarrow < \cos\psi >= 1 - \frac{r_d^3}{r_{d_{fd}}^3} \tag{2.8}$$

$r_{d_{fd}}$ is the radius of the free daons. The index *fd* is hereafter used for free daons.

The disorder produced by the surrounding free daons must pass through the ordered daons, since the number of surrounding free daons is much bigger than the ordered ones.

The daons are attracted to each other due to their order, while disorder produce an irregular action in all directions.

The interaction between two parallel daons of different size, as presented in figure 2.4, is

$$a_d = C\frac{v_d^2}{\sqrt{r_d^+ r_d^-}} \tag{2.9}$$

$\sqrt{r_d^+ r_d^-}$ is the effective radius of interaction, being the geometrical mean of their respective radii.

The order must become very low, at a distance sufficiently far from the electron's centre, i.e., a shell has here no "rigidity". The daons within such a shell are constantly replaced by the surrounding ones, but, the shells remain always in position, so that each shell has the same radial action to maintain the equilibrium. The radial action must therefore be constant, "far away" from the electron's center, i.e., the radial force density must be inverse proportional to the surface ($\frac{1}{r^2}$), we get, using equations (2.7 and 2.8),

$$\frac{r^2}{r_d^3} < \cos\psi >= \frac{r_e^2}{r_{d_{fd}}^3} \Rightarrow < \cos\psi >= \frac{r_e^2}{r_e^2 + r^2} \tag{2.10}$$

r_e is a radius of reference which is constant when the shells have no rigidity. But, the above equation can be used at any distance, if we allow r_e to vary close to the electron's center, where the action of the radial equilibrium is reduced.

We obtain, for a shell "far" from the electron's center, a constant radius r_e, which henceforth will be called the electron's reference radius r_{e_∞}.

The action between two shells far from the electron ($r >> r_{e_\infty}$) can now, by using equations (2.7, 2.8 and (2.10), be expressed as

$$f_\infty = C\sqrt{8}\pi \frac{r_{e_\infty}^2}{r_{d_{fd}}^3} v_d^2 \tag{2.11}$$

Chapter 3

Static electricity

Let's imagine two electrons without any movement relative to each other and relative to the surrounding free daons, placed at a distance $a >> r_{e_\infty}$ from each other, as presented in figure 3.1.

The action in the middle between the two electrons, is between two shells associated to different electrons. An interaction between such shells means interaction between daons with negative order ($< \cos\psi >< 0$) since the rotational axis of their respective daons are opposite in direction i.e. the daons should expand, under such an action, feeling a repulsion. How can then the radial equilibrium be maintained?

A daon deforms without any resistance so an individual daon can adapt itself to any situation. In the above case the size of the daons, between the two electrons, is bigger then for an isolated electron i.e. the daons must here have a stronger deformation of its radius (Δs). These big daons, must have a bigger angle ($\sin\chi_n$), between the daons within the same shell, to compensate for their increased size and therefore smaller number. A similar situation can be seen on the opposite side of the electron, here the daons reduce there sizes, giving a lower radial component, of the action between the daons within the same shell. The size of the daons will then decrease, adapting them selves until an equilibrium is reached.

3.1 Coulomb's law

We will from now on speak about force instead of action, since the acceleration of an ensemble of daons, due to an external action, must be the action divided by the number of effective ordered daons i.e. the mass.

The force between two electrons can now be obtained by integrating the radial force density ($\frac{f_n}{4\pi r^2}$), coming from the superimposed daons of the source electron (eq. 2.11) over the shells of the target electron. This follows from the fact that each electron must maintain its radial equilibrium, necessary since the surrounding free daons always give a constant disorder, independent from the

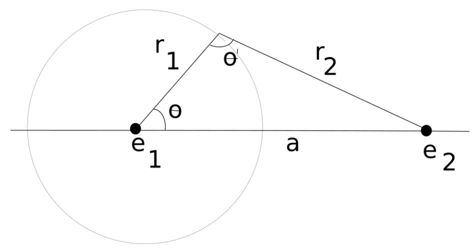

Figure 3.1: Schematic view of two electrons under interaction.

situation. The resulting force on a shell n, can therefore be obtained, using equation (2.11), in the following way

$$\begin{aligned} f_s &= \int_0^{\pi}\int_0^{2\pi} m_d \frac{f_n}{4\pi r_2^2}\frac{r_e^2}{r_1^2}\cos\theta' \cos\theta \; r_1^2 \sin\theta \; d\theta \; d\phi \\ &= m_d \frac{f_n}{3}\frac{r_e^2}{a^2} \end{aligned} \tag{3.1}$$

$$\begin{aligned} \cos\theta' &= \frac{r_1^2 + r_2^2 - a^2}{2r_1 r_2} \\ r_2^2 &= a^2 + r_1^2 - 2ar_1\cos\theta \end{aligned}$$

m_d is a system constant corresponding to the daon "mass", while θ' is the angle between the medium direction of the rotational axis of the daons in the selected shell and the medium direction of the superimposed daons of the source electron.

Notice that the integral has to be divided into two, due to the limit at $r = a$.

The sum of the force between the electron shells gives then the total force. r_{d_n} is very small, compared with the shell radius, so the sum can therefore be replaced by the integral. We obtain the Coulomb force as

$$F_C = \int_0^a \frac{(f_{s+1} - f_s)}{\Delta r_n}\, dr = \frac{f_\infty}{3}\,\frac{r_{e_\infty}^2}{a^2} \qquad a >> r_{e_\infty} \tag{3.2}$$

$\Delta r_n = \sqrt{\frac{8}{3}} r_{d_n}$ is the radial distance between two shells.

This means that *the Coulomb force is directly proportional to the surface density of the radial force equilibrium, of the daons belonging to source electron, at the position of the target electron*! The result will be identical if we invert the positions of the two electrons.

The shells starts to deform if the two electrons are very close, so let us therefore verify the equation (3.2), if the distance between the two electrons are much bigger than r_{e_∞}. We can then make the integral over any shell, having a constant charge, so if the source electron can be considered to be at an infinite distance, we get

$$f_s = -\int_0^{\pi}\int_0^{2\pi} \frac{f_\infty}{4\pi a^2}\frac{r_e^2}{r_1^2}\cos^2\theta \; r_1^2 \sin\theta \; d\theta \; d\phi$$

and the total force becomes

$$F_C = \frac{f_\infty}{3}\,\frac{r_{e_\infty}^2}{a^2}$$

i.e., identical with equation (3.2).

It is now possible to compare the classical electrostatic formula:

$$\vec{F}_C = \frac{e^2}{4\pi\epsilon_0}\frac{\vec{r}}{r^3}$$

with the corresponding expression for the daon theory:

$$\vec{F}_C = \frac{f_\infty}{3}\; r_{e_\infty}^2 \frac{\vec{r}}{r^3} \tag{3.3}$$

This gives, at a distance sufficiently far away ($r = r_{e_\infty}$), the definition of the dielectric constant as

$$\frac{e^2}{4\pi\epsilon_0} = \frac{f_\infty}{3}\; r_{e_\infty}^2 \tag{3.4}$$

i.e., **the dielectric constant is proportional to the radial force of the electron**.

It's now possible to redefine the concepts of field, charge, force, acceleration and mass of an electron, within the daon theory:

- The field concept can be understood as the acceleration felt by a positron placed in a given position i.e., directly proportional to the "radial force density". An "electric force line" locally coincides with the medium direction of a daons rotational axis.
- In the daon theory the charge is just an integer number, It is the number of "positive" radial equilibrium minus the "negative" ones, i.e., in the case of the electron it is -1.
- $\vec{F}_C$ is the force acting between the external superimposed order daons and the electron's radial equilibrium.

- The acceleration $\vec{a}$ acting on an electron is the total effective force, acting on the electron, divided by the total number of effective daons N_{tot} (the mass) making up the electron, giving the definition of acceleration as

$$\vec{a} = \frac{\vec{F}_C}{N_{tot} m_d} \tag{3.5}$$

- *The Daon has no mass* i.e., m_d is just a system constant. The Kilogram can, in fact, be redefined to a specific number of daons $\frac{1}{m_d}$.

E = 1 MV/m corresponds to an *order* of around 10^{-15}!

3.2 The electron's mass and potential energy

We can now calculate the electron's mass in the following manner:

$$m_e = m_d \int_0^\infty \frac{4\pi r^2}{\pi r_d^2} \frac{\pi}{2\sqrt{3}} < \cos\psi > \frac{r_e^2}{r^2} \frac{dr}{\Delta r} \tag{3.6}$$

i.e. the number of daons in a shell multiplied by the order, giving the number of effective daons (the mass) of the shell, which is again multiplied by $\frac{r_e^2}{r^2}$ (proportional to the radial force density), giving the tendency of the daons to follow the electron in its movement. The electron's reference radius (r_e) varies with the radius close to the electron's center, we have therefore not an exact analytical expression.

But, we can calculate, at a radius $r >> r_{e_\infty}$, the difference in mass due to the added order coming from the interaction between two electrons, i.e. the potential energy (see figure 3.1). We can then make a precise calculation of the added mass as

$$\begin{aligned} \Delta m &= m_d \int_a^\infty \int_0^\pi \int_0^{2\pi} \frac{r^2}{\pi r_d^2} \frac{\pi}{2\sqrt{3}} \cos\theta' \sin\theta < \cos\psi >_1 \frac{r_{e_\infty}^2}{r^2}{}_2 \, d\phi \, d\theta \frac{dr}{\Delta r} \\ &= m_d \frac{\pi}{\sqrt{2}} \frac{r_{e_\infty}^4}{r_{d_{fd}}^3 a} \qquad a >> r_{e_\infty} \end{aligned} \tag{3.7}$$

If we now introducing equation (2.11) into equation (3.7) and use the classical potential energy, we get

$$C = \frac{3}{2} \frac{c^2}{v_d^2} \tag{3.8}$$

The attraction between identical daons (Eq. 2.1), can therefore be written

$$a_d = \frac{3}{2}\frac{c^2}{r_d}\cos\psi \tag{3.9}$$

and the corresponding transverse action is

$$a_d = \frac{3}{2}\frac{c^2}{r_d}\sin\psi \tag{3.10}$$

which gives the radial equilibrium of force, "far" from the electron's center (eq. 2.11), as

$$f_\infty = 3\sqrt{2}\pi\frac{r_{e_\infty}^2}{r_{d_{fd}}^3}m_d c^2 \tag{3.11}$$

The Coulomb's law within the daon theory, using equation (3.4), is therefore

$$\vec{F}_C = \frac{q_1 q_2}{e^2} m_d \sqrt{2}\pi\frac{r_{e_\infty}^4}{r_{d_{fd}}^3}c^2\frac{\vec{r}}{r^3} \tag{3.12}$$

$\frac{q}{e}$ is number of effective radial equilibrium, within a particle.

3.3 Some other characteristics of the electron

A better understanding of the electron is necessary, to make us able to complete the analysis. A computer code called EP was therefore developed to examine the electron's internal equilibrium.

The electron is perfectly spherical so, it's enough to optimize the radial position of each shell of constant order. As a starting point, approximate radial position for a number of shells were chosen.

The equation of radial equilibrium (2.5) can then be used to calculate the order in each shell. Starting far from the electron, where the radial equilibrium has an asymptotic constant value, we proceed in iterations step by step closing in on the electron's center, finally obtaining a mesh with a radial equilibrium of force.

It is thereafter necessary to normalize the radii relative to a true electron. This is done in two steps; first we vary the value of r_{e_∞}, until the total mass of the simulated electron agrees with the true value. This is done, using equation (3.6), within the code EP. We obtain $r_{e_\infty} \simeq 1.3316\ 10^{-15}\ m$.

The free daon size $r_{d_{fd}}$ and the system constant m_d are still missing, but, it is enough to find one to find the other, according to equation (3.4). Their values can be obtained examining the first few shells at the electron's center. The number of daons within a shell is here precisely known since the necessary geometry impose a limited number of daons at the electron's center (6 seems to be the best candidate). We therefore adapted the daon size, to give the correct radial equilibrium in the first couple of shells, at the electron's center.

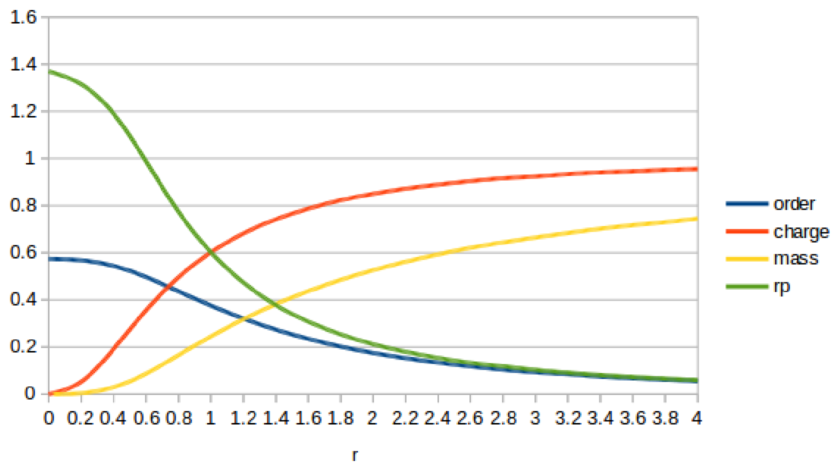

Figure 3.2: Graph showing the radial variation of the order, the normalized charge ($\frac{r_e^2}{r_{e_\infty}^2}$), the normalized mass ($\frac{m}{m_e}$) and the normalized radial pressure ($rp = \frac{r_e^2}{r^2}$) relative to the normalized electron radius $\frac{r}{r_{e_\infty}}$.

The electron's mass is obtained when the central daons uphold the radial equilibrium with the imposed external geometry.

We get $m_d \simeq 2.9\ 10^{-41}$ kg and $r_{d_{fd}} \simeq 5.4\ 10^{-19} m$, at the above mentioned limit. We have then a mesh with a radial equilibrium of force, as well as, an agreement between its mass and the true electron mass.

In figure 3.2 is presented a graph showing the radial variation of the simulated electron's main parameters, when the electron has no velocity relative to the free daons.

Chapter 4

An electron with constant velocity

Imagine an electron, travelling at a constant velocity $\mathbf{v}$, within a media of free daons. It then exists a relative velocity between the electron and the surrounding daons, which modifies their order and velocity, relative to the electron. The shells of daons around the electron still exist but, the daons constituting them are gradually replaced by new ones, depending on the strength of their attraction relative to the electron.

The velocity of a signal, extending from the electron, becomes an important parameter, it will, in the following be called the signal velocity. The velocity of a signal, passing through a daon media, must depend on the substance velocity inside the daons them selves, but could also depend on the relative direction of the substance, i.e. the position of the zones of interaction relative to the direction of the signal. But, a dependence on the relative inclination of the daon axis would produce a gradual reduction of the signal's velocity and/or strength, which doesn't agree with experience (Maxwell's equations for example). The signal velocity must therefore be defined, as a constant velocity in all directions, in the following manner

$$c_s = K\omega_d r_d = K v_d \tag{4.1}$$

r_d is the daon radius and v_d is the daon's velocity of rotation at its equator, while K is an arbitrary constant.

The shells are attached to the electron through the radial force, which is constant for each individual shell. The velocity of a daon, relative to the free daons, can therefore be written:

$$v_d = v\frac{r_e^2}{r^2} \tag{4.2}$$

where v is the velocity of the electron and r_e is the reference radius of the selected shell.

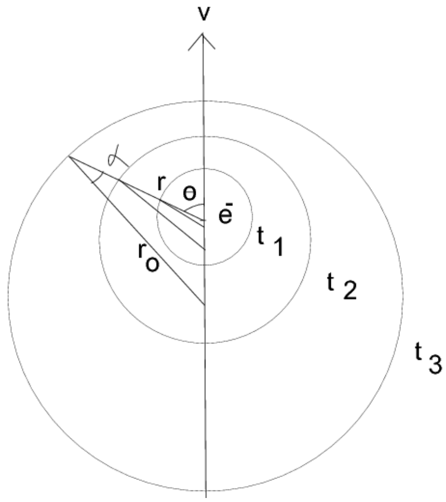

Figure 4.1: Spheres reached, at the same time, by the "delayed" signal coming from the electron's center

A signal, from the electron's center, reach therefore, at the same time, the surface of a sphere around the electron, having the form presented in figure 4.1,

$$\begin{aligned} r &= r_0(\cos\alpha - \beta(1 - \frac{r_e^2}{r^2})\cos\theta) \qquad r >= r_{\frac{1}{2}} \\ r &= r_0 \qquad\qquad\qquad\qquad\qquad\quad r <= r_{\frac{1}{2}} \end{aligned} \tag{4.3}$$

$$\cos\alpha = \sqrt{1 - (1 - \frac{r_e^2}{r^2})^2\beta^2\sin^2\theta}$$

$$\beta = \frac{v}{c_s}$$

$r_{\frac{1}{2}}$ is the radius of transition, where the electron radius and the reference radius become identical, while r_0 is the radius of a shell without velocity relative to the free daons.

Looking at the inclination of the daons at a fixed angle (θ), we find a different angle (α) of inclination for daons in different shells. The difference in inclination must then be the source of a rotation, according to equation (3.10), around the electron's velocity vector $\vec{v}$.

The relative inclination δ between daons from neighbouring shells, due to the delayed potential, can be expressed as:

$$\sin\delta = \frac{v[(\frac{r_e^2}{r^2})^+ - (\frac{r_e^2}{r^2})^-]\sin\theta}{c_s} \qquad r >= r_{\frac{1}{2}} \tag{4.4}$$

This difference in angle, of the daons axis of rotation, must therefore produce a rotation of the daons around the electron, giving a relative difference of velocity between neighbouring shells, which can be written:

$$\Delta v_\phi = \omega_d r_d \sin\delta \tag{4.5}$$

The daons rotational velocity around the electron, as seen from the surrounding free daons, is then

$$\begin{aligned} v_\phi &= \frac{v}{K}\frac{r_e^2}{r^2}\sin\theta \qquad r >= r_{\frac{1}{2}} \\ v_\phi &= \frac{v}{K}\frac{r}{r_{\frac{1}{2}}}\sin\theta \qquad r <= r_{\frac{1}{2}} \end{aligned} \tag{4.6}$$

$r_{\frac{1}{2}}$ is the radius where the electron becomes a rigid body, which happens when the radius is equal to the reference radius r_e ($r_{\frac{1}{2}} = 7.8527810^{-16}m$).

4.1 Inertial movement of the electron

The rotation of the daons around the electron, as seen relative to the surrounding free daons, is faster at smaller radius so that we obtain a relative inclination of the daons in the transverse sense, perpendicular to the one due to the delayed potential, as presented in figure 4.2. This inclination must again take a value corresponding to the relative velocity i.e.

$$\sin\delta' = \frac{\Delta v_\phi}{c_s} \tag{4.7}$$

note that the inclination of the daons (in the transverse sense relative to the delayed potential) is always very small, since here only the relative velocity is important. There is no accumulation of the angle (as there is in the case of the delayed potential), because the center of the electron is always in the same relative position.

This relative velocity between the daons **must** in equilibrium, give the sliding movement between the daon shells, due to the propagation, and can therefore be written

$$\omega_d r_d \sin\delta' = \frac{v}{K^2}(\frac{r_e^2}{r^2})^+ - (\frac{r_e^2}{r^2})^-)\sin\theta \tag{4.8}$$

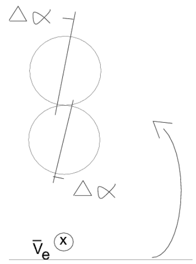

Figure 4.2: The inclination of the daons, in the sense perpendicular to the delayed potential.

We obtain

$$\sin\delta' = \sin\delta \Rightarrow K = 1 \tag{4.9}$$

The transverse inclination of the daons is then perfectly matched to the relative velocity, between the shells, so that the velocity of rotation directly corresponds to the velocity of propagation.

$$\begin{aligned} v_\phi &= v\frac{r_e^2}{r^2}\sin\theta \qquad r >= r_{\frac{1}{2}} \\ v_\phi &= v\frac{r}{r_{\frac{1}{2}}}\sin\theta \qquad r <= r_{\frac{1}{2}} \end{aligned} \tag{4.10}$$

This is the reason for the electron's inertial movement, since then all forces are perfectly compensated.

4.2 Magnetism

The basic equation of magnetism, shows that the force is proportional to the velocity of the electron and to a *magnetic field*.

$$\vec{F} = e\vec{v} \times \vec{B}$$

This magnetic field, within the proposed theory, can only be a flux of daons, as presented in figure 4.3(a).

Imagine an electron with a velocity $\mathbf{v}_1$, at a distance a from another electron, which has a velocity $\mathbf{v}_2$. The daons circulating around the source electron will pass around the examined electron. But, a constant flux around an electron is identical to an electron with a constant velocity in a media of free daons, so, why is the electron deviating from its trajectory? The only possible explanation

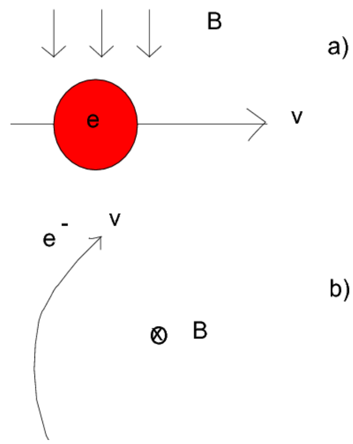

Figure 4.3: Phenomenon of magnetism.

is that the daons circulating around the source electron is always connected to the electron through the radial force equilibrium. The examined electron must therefore start to rotate, this rotation will continue to increase until it reach an equilibrium, which happens when its velocity of rotation, corresponds to the velocity of the daon flux surrounding it. This rotation must bend the electron's velocity vector in the direction of rotation, leading to a change of the electrons direction of flight, as presented in figure 4.3(b).

We now calculate the force, corresponding to an electron's velocity, in the direction of flight. This can be calculated imagining that the electron is fixed relative to its surrounding but having a rotation corresponding to the velocity v. The inherent force parallel to the velocity vector $\vec{v}$ can then be calculated to

$$F_{\|} = m_d \int_0^\infty \int_0^\pi \int_0^{2\pi} \frac{r^2}{\pi r_d^2} \frac{\pi}{2\sqrt{3}} K a_d \sin\delta \sin\theta \sin\theta \; d\phi \; d\theta \frac{dr}{\Delta r} = \frac{f_\infty}{3} \frac{v}{c_s} \tag{4.11}$$

The direction of the force is perpendicular to the electron radius. a_d is the action between daons, while $\Delta r (= \sqrt{\frac{8}{3}} r_d)$ is the distance between shells. The factor K comes from the interaction between each daon and the three daons in the neighbouring shell, as indicated in figure 4.4.

$$K = \cos\eta \frac{1}{\pi} \int_0^\pi (\cos^2\phi + \cos^2(\phi + \frac{2\pi}{3}) + \cos^2(\phi - \frac{2\pi}{3})) d\phi = \sqrt{\frac{3}{2}}$$

This is the medium action from three zones of contact between a daon and the daons in the next shell. η is the angle between the electron's radius and a line connecting the centres of two daons in interaction, belonging to neighbouring shells ($\cos\eta = \sqrt{\frac{2}{3}}$ since the geometry is a regular pyramid).

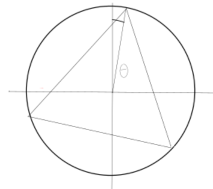

Figure 4.4: The geometry of the interaction, perpendicular to the electron radius, between each daon and the daons in a neighbouring shell.

The external flux of free daons produce a force rotating the electron (see figure 4.3(b)), v_{ϕ_2}, this force the electron to turn, i.e., its velocity vector will be deviated, in the sense of the rotation. This corresponds to a force (eq. 4.11), multiplied with the angle of rotation, which can be written

$$F_M = \int_{r_e}^{\infty} \frac{f_n}{3} \frac{v_1 v_{\phi_2} (\frac{r_e^2}{r^2})^- - (\frac{r_e^2}{r^2})^+)}{c_s^2} \frac{dr}{\Delta r} \tag{4.12}$$

$+$ indicates the outer shell, while the $-$ indicates the inner shell.

Introducing the velocity from the source electron's circulating daons (see equation 4.10), into equation (4.12) we get,

$$F_M = \frac{f_\infty}{3} \frac{v_1 v_2}{c_s^2} \frac{r_{e_\infty}^2}{r^2} \sin\theta_2 \qquad\qquad r >> r_{e_\infty} \tag{4.13}$$

θ_2 is the angle between the actual position of the source electron and the position of the target electron (an explanation will be given below), relative to the velocity vector $\vec{v}_2$.

The daons around the electron will bend, with a value corresponding to the relative velocity between the electron and the free daon flux, produced by the source electron. This angle will force the electron to rotate, until an equilibrium is reached, where the rotation of the electron corresponds exactly to the angle created by the free daon flux.

Notice that, according to the definition of the direction of the magnetic field, the daons must be directed away from the electron's s center, respectively towards the center for a positron.

Comparing this with the corresponding classical expression,

$$F_M = \frac{\mu_0}{4\pi} e\vec{v}_1 \times e\vec{v}_2 \times \frac{\vec{r}}{r^3}$$

there is perfect agreement, if the signal velocity is equal to the light speed,

$$c_s = \omega_d r_d = c \tag{4.14}$$

This means that **the daons effective velocity of rotation is equal to the light speed** (it is of coarse the other way around).

The permeability becomes

$$\mu_0 = \frac{1}{\epsilon_0 c^2} \qquad (4.15)$$

B = 1 Tesla corresponds to a flux of free daons with a velocity of around 10^{-4} m/s!

It should be noted that the electric force comes from the interaction between daons, expressed in equation (3.9), while the magnetic force originates from the transverse daon interaction, presented in equation (3.10).

Chapter 5

An electron's associated wave

It is known that the electron has some, not well defined, oscillation producing the so called associated wave. Such an oscillation must, within the daon theory, be produced by its transverse velocity.

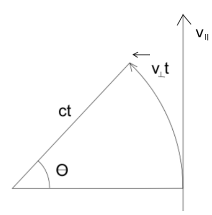

Figure 5.1: The difference in the radial equilibrium, due to the curvature of the trajectory.

We will start by examining an electron, having a velocity $\mathbf{v}$, following a trajectory with a radius of curvature r, due to an external force, as indicted in figure 5.1. The electric field of such an electron is deformed, corresponding to the response from the surrounding daons. This is due to the shorter way the "action-signal" has to go on the side of the bend, relative to the opposite side, as demonstrated in figure 5.1. The electron therefore feels a supplementary action in the direction of the bend, in exactly the same way as was already calculated for the longitudinal direction, in equation (4.11), the resulting transverse action becomes

$$F_{\perp} = \frac{f_{\infty}}{3} \frac{r_e^2}{r^2} \frac{v_{\perp}}{c} \qquad \text{if } r >> r_e \tag{5.1}$$

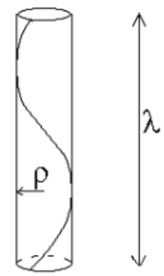

Figure 5.2: Schematic presentation of the spiralling movement of the electron.

This is the *reflected* signal, at the position of the electron, while $v_\perp$ is the transverse velocity.

This transverse force can become permanent if it exists an equilibrium of force and energy, in the transverse sense.

5.1 The fine structure constant

The electron's transverse velocity must be smooth since the interaction with the surrounding daons also must be smooth. The only possible such motion is therefore a spiralling trajectory. The electron's trajectory can then be placed on a cylinder, having a radius ρ, where λ corresponds to a piece of a cylinder of one complete turn, as indicated in figure 5.2.

We can now write the angular velocity of precession as

$$\begin{aligned} \omega_p &= \frac{v \sin\eta}{\rho} = \frac{2\pi v \cos\eta}{\lambda} \\ \Rightarrow \tan\eta &= \frac{2\pi\rho}{\lambda} = \frac{v_\perp}{v_\parallel} \end{aligned} \tag{5.2}$$

which, using equations (5.1 and 3.4), gives the transverse equilibrium of force as

$$F_\perp = \frac{f_\infty}{3}\frac{r_e^2}{\rho^2}\frac{v_\perp}{c} = m_e\frac{v_\perp^2}{\rho} \Rightarrow m_e v_\perp \rho = \alpha\hbar \tag{5.3}$$

This perpendicular action has a constant angular momentum, which gives the fine structure constant α. *The transverse action must therefore be the real source for the law of Louis de Broglie.*

The time necessary for a complete oscillation, in the transverse and the longitudinal sense, gives then

$$m_e v_\perp \rho = m_e v_\parallel \frac{\lambda}{2\pi} \frac{v_\perp^2}{v_\parallel^2} \Rightarrow \hbar = \frac{e^2}{4\pi\epsilon_0 c \tan^2 \eta} \tag{5.4}$$

which means that the fine structure constant α can be written

$$\alpha = \tan^2 \eta = \frac{(2\pi\rho)^2}{\lambda^2} = \frac{v_\perp^2}{v_\parallel^2} \tag{5.5}$$

i.e., **the fine structure constant is the square of the ratio between the transverse and the longitudinal velocities.**

It should be noted that the electron's associated wave (spiralling trajectory) can be left or right handed. This is due to the transverse force-energy equilibrium, which is independent from the direction of the spiral. The electron itself is always spinning in the left-handed direction, giving the correct magnetic flux!

5.2 Synchrotron radiation

Once the electron's associated wave is understood, the explanation for the synchrotron radiation becomes evident.

The electron's spiralling motion (see figure 5.3), has as consequence that a magnetic or electric field, perpendicular to the medium path of the electron, corresponds to adding a supplementary transverse velocity ($v_\perp$). This means that the transverse movement of the electron's associated wave, corresponds to a periodic acceleration and deceleration, which must be a source of radiation.

A magnetic field is proportional to the velocity of the free daon flux around the target charge (eq.4.13), i.e.

$$B = \frac{e}{4\pi\epsilon_0 r_{e_\infty}^2} \frac{v_B}{c^2} \tag{5.6}$$

v_B is always very small (1 Tesla $\simeq 10^{-4} \frac{m}{s}$).

The electric field has an effect corresponding to a velocity, which can be calculated from

$$\frac{v_E}{c} = \frac{r_e^2}{r^2} \tag{5.7}$$

v_E is also always very small ($1 \frac{MV}{m} \simeq 10^{-15}$; $\quad v_E \simeq 10^{-6} \frac{m}{s}$).

The frequency of the radiation (non relativistic) must correspond to the associated wave, i.e.

$$\nu = \frac{v_\perp}{2\pi\rho} N = \frac{v_\parallel}{\lambda} N \qquad \text{N = 1,2,3,...} \tag{5.8}$$

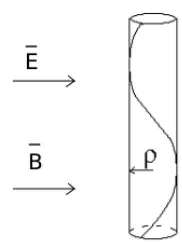

Figure 5.3: Schematic showing the synchrotron radiation principal.

Chapter 6

An electron under acceleration

An electron under acceleration produce an added inclination of the daons rotational axis, in the same way as for the delayed potential (see figure 4.1).

The added inclination of the daons, gives as results an added rotational velocity around the electron under acceleration. The difference in rotational velocity between two shells, due to the difference in angle, as indicated in figure 6.1, can then be written:

$$\Delta v_\phi = \frac{at}{c}(\frac{r_e^2}{r^2})^+ - (\frac{r_e^2}{r^2})^-)c\sin\theta \qquad r > r_{\frac{1}{2}} \tag{6.1}$$

$$t = \frac{r}{c}$$

giving the resulting velocity of rotation, seen from the external free daons, as:

$$v_\phi = \frac{a \times r}{c}\frac{r_e^2}{r^2}\sin\theta = \frac{a}{c}\frac{r_e^2}{r}\sin\theta \qquad r >> r_{\frac{1}{2}} \tag{6.2}$$

This added rotation gives a supplementary magnetic field, using equation (3.4), giving

$$\vec{B}_a = \frac{\mu_0}{4\pi c}\frac{\vec{a} \times \vec{r}}{r^3} \tag{6.3}$$

We also obtain a transverse inclination of the daons, as presented in figure 6.1, this inclination is due to the fact that the electron has not had the necessary time to adjust its rotation. The inclination of the daons axis must therefore be such that the daons action produce an acceleration or a deceleration of the electron, according to the direction of the imposed flux. We can then calculate the force acting on the electron, in a similar way as was done in equation (4.11), giving:

$$\vec{F} = -\frac{f_\infty}{3}\frac{(\vec{a}\times\vec{r})\times\vec{r}}{rc^2} \tag{6.4}$$

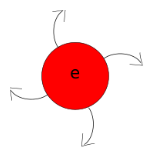

Figure 6.1: The inclination of the daons, in the sense perpendicular to the delayed potential.

The corresponding "induced electrical field" can be written in a classical manner, using equation (3.4), as

$$\vec{E}_B = -\frac{\mu_0}{4\pi r_{e_\infty}^2}\frac{(\vec{a}\times\vec{r})\times\vec{r}}{r} \tag{6.5}$$

It should be noted that the "electrical" part of this action is in fact magnetic, since the interaction between daons corresponds to an action *perpendicular* to the mean direction of the daons rotational axis (see magnetism and equation 3.10)!

Note that this force is in the opposite direction relative to the acceleration $\vec{a}$, i.e. we get a force resisting changes in velocities!

6.1 The Electro-Magnetic wave

The Electro-Magnetic wave is, in principle, the transmission of an Electro-Magnetic signal through space. The source of sending and receiving, such a signal, is an antenna. A very simple antenna is a perfect straight conductor, so thin that the transverse dimension can be neglected. An oscillating sinusoidal current is imposed, on such an antenna, with a wavelength well adapted to the length of the antenna. The source of the EM-field is then the electrons oscillation, within the conductor.

Only the magnetic flux, coming from the acceleration/deceleration of the electron (eq. 7.2), depends on the distance in such a way that the EM-wave can be explained. Let us therefore start from this equation, giving the velocity of rotation for the daons, at a distance $r >> r_{e_\infty}$, produced by an accelerating electron within the conductor.

$$v_\phi = \frac{a_e}{c}\frac{r_{e\infty}^2}{r}\sin\theta\cos(\omega(t+\frac{r}{c})) \tag{6.6}$$

This is already the magnetic part of the EM-wave, what is missing is therefore the electric part, which can be found examining an individual daon, within the "cylindrical shells" of the daons movement around the antenna.

We should first recall how the daons are interacting between themselves, from equations (3.9 and 3.10) and the figure 2.2.

Depending on the orientation of its axis of rotation, a daon can be attracted or repulsed or get an impulse in the direction parallel to the velocity vector, as demonstrated in figure 6.2. If a daon's axis is parallel to the movement of the daons, around the conductor, it will be pushed in the direction of the daon flux, according to equation (3.10). If its axis is perpendicular to the direction of the surrounding daons movement, it will be pushed to or from the antenna, depending on the direction of its axis, relative to the direction of the electrons velocity, according to equation (3.9).

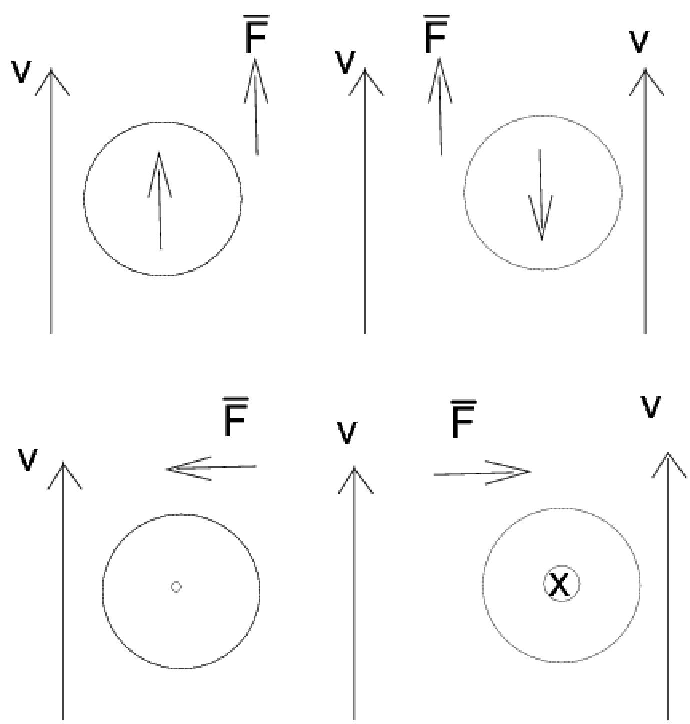

Figure 6.2: Phenomenon separating the order

This phenomenon therefore separates and orders the daons, within the wavelength of the oscillation, which is exactly what we are looking for! The order is separated, within the half period of oscillation, into two regions composed by daons having, in media, opposite directions of their rotational axis. It follows that the daons in between these two ordered regions, in the next half period, will obtain a velocity in a direction parallel to the shells and perpendicular to the electron's velocity vector, as schematically presented in figure 6.2.

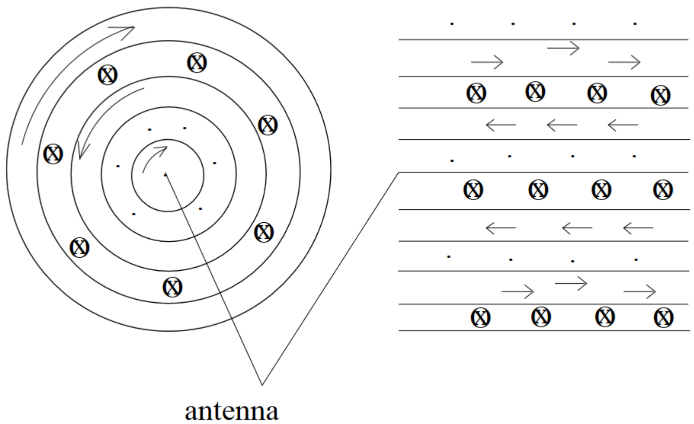

Figure 6.3: Phenomenon of EM-waves

This phenomena leads therefore to a sinusoidal behaviour, of both the order and the rotational velocity, of the daons but, displaced with $\frac{\pi}{2}$ radians in time and radial position, relative to each other. It means that the magnetic flux create an "electric order" corresponding perfectly to the magnetic one, which is the reason why an oscillation is produced, creating the electromagnetic wave.

If we examine an individual daon, we find that it is rotating around an axis perpendicular to its rotational axis and parallel to the antenna's radius vector, while, in the following half period it will oscillate perpendicular to the antenna and its radius vector. This means that the daons stay in their medium position while oscillating and rotating.

The action-reaction, once produced, can *not* be lost in dissipation since the action-reaction between daons is without dissipation. So the electromagnetic wave must continue to expand away from the antenna in infinity, with the signal velocity c. The electric and magnetic fields around the antenna can be written in a general manner as

$$E = \frac{f_\infty}{3} \frac{r_{e_\infty}^2}{r^2} \tag{6.7}$$

$$B = \frac{f_\infty}{3} \frac{v_M}{c^2} \tag{6.8}$$

v_M is the rotational velocity of the free daons (magnetic field).

we obtain, according to equations (6.3 and 6.5), for the individual accelerating electron,

$$
\begin{aligned}
\frac{\vec{r}_E}{r^3} &= \frac{\vec{a}\times\vec{r}}{c^2r^2}\sin(\omega(t-\frac{r}{c})) && (6.9)\\
\vec{v}_M &= \frac{\vec{a}\times\vec{r}}{c}\frac{r_{e_\infty}^2}{r^2}\sin\theta\cos(\omega(t-\frac{r}{c})) && (6.10)
\end{aligned}
$$

The equations (6.7 and 6.8) can now be developed on a piece of conductor, using equations (6.9 and 6.10), giving:

$$
\begin{aligned}
\vec{E} &= \frac{\mu_0}{4\pi}\int\frac{\delta I}{\delta t}\vec{ds}\times\vec{r}\times\frac{\vec{r}}{r^3}\\
\vec{B} &= \vec{v}_1\times\frac{\mu_0}{4\pi c}\int\frac{\delta I}{\delta t}\vec{ds}\times\frac{\vec{r}}{r^2}
\end{aligned}
$$

which are the classical laws.

We also obtain, from the above, that the minimum wave length of an EM-wave must be bigger than some free daon radii, i.e. $> 10^{-19}\ m$, while there is no upper limit.

Chapter 7

Modification of an electron's characteristics at high velocity

The electron's characteristics change due to the difference in velocity between the center of the electron and the surrounding free daons. This difference is produced by the limited value of the signal velocity (c), it is therefore necessary that the shells adapt themselves to the action-reaction signal, coming from the internal shells versus the external and the signal coming from the external shells versus the internal ones.

7.1 Modification of the electron shells effective radial position

Let us suppose that the electron has a velocity **v** relative to the surrounding "free daons" (i.e. daons being completely disordered). The daons will then orient themselves relative to the position of the electron at the moment it was sending its "signal of existence" (delayed potential). The geometrical situation of some shells of daons, reached at the same time by the "signal of existence" from the electron, is indicated in figure 4.1.

The distance between the electron's center and one of these spheres is

$$\begin{aligned} r &= r_0 f(\theta) \qquad r >= r_{\frac{1}{2}} \\ r &= r_0 \qquad\qquad r <= r_{\frac{1}{2}} \end{aligned} \tag{7.1}$$

We now examine the same delayed potential, but now starting from a sphere around the electron, ahead relative to the electron's center so that the signal from the sphere will reach the center at the same time. Such an arrangement will give the same equation (6.1) but now in the opposite direction i.e. $f(\theta-\pi)$.

The geometrical mean difference in the signal path gives then the effective shell radius to be,

$$r = \sqrt{\frac{r_0}{f(\theta)}\frac{r_0}{f(\theta-\pi)}} = \frac{r_0}{\sqrt{1-\beta^2(1-\frac{r_e^2}{r^2})^2}} \tag{7.2}$$

The inclination of the rotational axis of the daons, relative to the electron radius, in a given shell, is

$$\cos\alpha = \sqrt{1-\beta^2(1-\frac{r_e^2}{r^2})^2\sin^2\theta} \tag{7.3}$$

But this means that their is a difference in angle (α), between neighbouring shells! The consequence of this difference is that the daons action between shells is reduced, this reduction has to be included in both directions, as presented in figure 7.1. This means that the radial force is reduced by a factor $\cos^2\alpha$, but, since the radial equilibrium must be maintained, this impose an increase of the radial force by a factor $\frac{1}{\cos^2\alpha}$. The size of the daons within an electron's shell is constant, the shell radii must therefore increase with a factor $\frac{1}{\cos\alpha}$, to maintain the constant order within each shell. The form of the shells must therefore be flattened out in the direction of velocity.

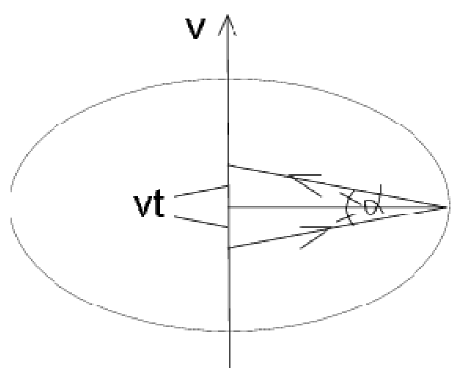

Figure 7.1: Geometry of the em-fields around an electron at constant velocity.

We obtain that the total deformation of the electron's shells are

$$r_v = r_0\frac{1}{\cos\alpha\sqrt{1-\beta^2(1-\frac{r_e^2}{r^2})^2}} \tag{7.4}$$

The electron's radial equilibrium remains always spherical, even when the shells, of constant order, are deformed.

7.2 Mass increase

The electron don't feel the deformation of its shells, but do feel a decrease of its radial force, by the area as well as by the radius, resulting in a total reduction of a factor $\frac{1}{(1-\beta^2(1-\frac{r_e^2}{r^2})^2)^{\frac{3}{2}}}$.

But, this corresponds, in the external part of the electron, to an increase of the free daons radius by a factor $\gamma = \frac{1}{\sqrt{1-\beta^2}}$. It is the size of the free daons which decides the characteristics of the electron, the change of the electron's external force equilibrium must therefore penetrate throughout the electron. We can now calculate our electron's mass, again using the program EP (eq. 3.6), we multiply the size of the free daons with γ, keeping the daon "mass" m_d at a constant value. We thereafter varies the radius of reference r_e (r_e is directly proportional to $\gamma^{\frac{4}{3}}$ from 0 to r_{e_∞}) until we obtain an agreement between the radial force with the same fixed number of daons, as before, in the last few shells. We obtain

$$r_{e_v} = r_{e_\infty}\gamma^{\frac{4}{3}} \qquad \Rightarrow m_{e_v} = \gamma m_e \tag{7.5}$$

This value of r_{e_v} is not very precise, so we did several runs with very different γ, to cover as broad a range as possible, giving a higher precision to equation (7.5).

The electron increase its size and the number of daons it contains, it absorbs ordered daons, from the electrical field which is accelerating it.

But, what happens to this law if we include the associated wave? Well, we get the modification on the effective velocity as

$$\sqrt{v_\parallel^2 + v_\perp^2}\cos\eta = v_\parallel \tag{7.6}$$

$v_\parallel$ is the mean velocity of the electron while $v_\perp$ is the transverse velocity. η is the angle between the reflected signal and the electrons velocity vector.

$$\cos\eta = \sqrt{1 - \frac{v_\perp^2}{v_\parallel^2 + v_\perp^2}}$$

i.e. the mass law remains unchanged, if we use the mean longitudinal velocity in place of the total velocity!

We obtain again the Einstein's mass formula [5].

(A general discussion of the special relativity theory will be done in[1].)

7.3 Modification of an electron's radial equilibrium

We can now obtain the effective radial force equilibrium's dependence of velocity, using equation (3.11),

$$f_{n_v} = 3\sqrt{2}\pi \frac{r_e^2 \gamma^{\frac{8}{3}}}{\gamma^3 r_{d_{fd}}^3} m_d c^2 \qquad \Rightarrow f_{n_v} = \frac{f_n}{\gamma^{\frac{1}{3}}} \tag{7.7}$$

The electric field around the electron is the radial equilibrium multiplied with $\frac{r_e^2}{r^2}$, i.e., the E-field is increased by a factor $\gamma^{\frac{7}{3}}$!

To this should be added the modification of the velocity of the daons, circulating around the electron

$$v_{\phi_v} = v \frac{r_e^2 \gamma^{\frac{8}{3}}}{\gamma^2 r^2} \sin\theta \qquad \Rightarrow v_{\phi_v} = \frac{v_\phi}{\gamma^{\frac{1}{3}}} \tag{7.8}$$

The magnetic field around the electron is the radial equilibrium multiplied with $\frac{v}{c^2} \sin\theta \frac{r_e^2}{r^2}$, i.e., the B-field is also increased by a factor $\gamma^{\frac{7}{3}}$!

Notice that there is no direct measurement of the deformed EM-field around a charge! We can therefore not compare this law with experimental measurements.

Conclusion

We show, starting from general considerations, that a new theory of physics can be developed. We introduced a new unique object, called the **Daon**, it has specific, but rather simple, characteristics, it has only 3 parameters; its effective velocity of rotation (c), the radius of a free daon ($r_{d_{fd}}$) and "the daon mass" (m_d). There is no freedom to match or adapt these values.

The Daon is proposed as the constituent of the electron and of its surrounding electromagnetic field. We found and expressed the value of the dielectric constant and showed that the electric and the magnetic phenomena, can be explained as the daons collective behaviour. We examined the electron's internal equilibrium, as well as, its mass and charge.

We found that an important parameter is the electron's reference radius r_{e_∞} which is fixed by the geometrical necessity for a radial equilibrium.

We calculate the fine structure constant and the Planck's constant while examining the associated wave of the electron.

We explain the Electro-Magnetic wave.

We calculate the modifications of the electrons characteristics at high velocity ($v \simeq c$).

This simple and effective theory gives a detailed explanation to all electromagnetic phenomena, as far as can be understood by the author.

Acknowledgement

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